rays **60-1**, **60-2**, and **60-5** of FIG. **3** at output angle C**1**. Similarly, the set of holograms in reflection hologram structures **42** may include a first reflection hologram in region **64** that is configured to diffract light from incident angle B**3** (e.g., ray **60-8**) at output angle C**2** (as shown by ray **55-3**) and a second reflection hologram in region **64** that is configured to diffract light from incident angle B**4** (e.g., ray **60-9**) at output angle C**2** (e.g., towards eye box **24** of FIG. **2**). While not shown in the example of FIG. **4** for the sake of clarity, additional reflection holograms may be recorded in region **64** for diffracting rays **60-6**, **60-7**, and **60-10** of FIG. **3** at output angle C**2**. Regions **62** and **64** may, for example, be defined by the widest diffraction angle of structures **42** and **44**. Holograms in region **62** may overlap with holograms in region **64** if desired.

[0052] In this way, each replicated ray from incident ray **56-1** of FIG. **3** may be diffracted towards eye box **24** in parallel by the reflection holograms in region **62** and each replicated ray from incident ray **56-2** of FIG. **3** may be diffracted towards eye box **24** in parallel (e.g., for focusing pupils **46**, **48**, **50**, **52**, and **54** of FIG. **2** on eye box **24**). Additional holograms may be formed in additional regions of reflection hologram structures **42** for diffracting the light replicated by transmission hologram structures **44** from each incident angle of input light **56**. This may serve to replicate the displayed image across the eye box such that no perspective change is observed by the user as their eye transitions or shifts through the eye box. In the example of FIG. **4**, operation on light of a single wavelength is shown for the sake of clarity. If desired, the number of holograms in reflection hologram structures **42** may be multiplied for each wavelength of light that is projected onto multi-layer holographic combiner **40**.

[0053] The holograms used to form multi-layer holographic combiner **40** may operate on light having any desired wave front shape. As one example, the transmission holograms used to form transmission hologram structures **44** may each be plane-wave-to-plane-wave transmission holograms, point-to-plane-wave transmission holograms, or point-to-nearly-plane-wave transmission holograms. Similarly, the reflection holograms used to form reflection hologram structures **42** may each be plane-wave-to-plane-wave reflection holograms, point-to-plane-wave reflection holograms, or point-to-nearly-plane-wave reflection holograms.

[0054] FIG. **5** is a diagram of illustrative point-to-plane-wave holograms that may be used in implementing transmission hologram structures **44** and/or reflection hologram structures **42**. As shown in FIG. **5**, a holographic recording (grating) medium such as medium **70** may include a corresponding hologram. A point light source **72** may provide incident light towards medium **70** in direction **74**. The incident light may exhibit spherical wave fronts **78** propagating outwards from point source **72**. In scenarios where a point-to-plane-wave transmission hologram is recorded on medium **70** (e.g., in scenarios where medium **70** of FIG. **5** is used to form transmission hologram structures **44** of FIGS. **2-4**), the point-to-plane-wave transmission hologram will diffract incident light **78** into an output angle at the opposing side of medium **70**, as shown by arrow **76**. The diffracted light exhibits parallel (planar) wave fronts **80** (e.g., the hologram serves to diffract incident spherical wave fronts into outgoing parallel wave fronts).

[0055] In scenarios where a point-to-plane-wave reflection hologram is recorded on medium **70** (e.g., in scenarios where medium **70** of FIG. **5** is used to form reflection hologram structures **42** of FIGS. **2-4**), the point-to-plane-wave reflection hologram will diffract incident light **78** into an output angle at the same side of medium **70** as the incident light, as shown by arrow **76'**. The diffracted light exhibits parallel (planar) wave fronts **80'** (e.g., the hologram serves to diffract incident spherical wave fronts into outgoing parallel wave fronts). When configured in this way, the hologram itself exhibits optical power (e.g., optical power that could otherwise be provided with a curved, refractive optical surface but without requiring the space necessary to implement a curved, refractive optical surface).

[0056] FIG. **6** is a diagram of illustrative point-to-nearly-plane-wave holograms that may be used in implementing transmission hologram structures **44** and/or reflection hologram structures **42**. In scenarios where a point-to-nearly-plane-wave transmission hologram is recorded on medium **70** (e.g., in scenarios where medium **70** of FIG. **6** is used to form transmission hologram structures **44** of FIGS. **2-4**), the point-to-nearly-plane-wave transmission hologram will diffract incident light **78** into an output angle at the opposing side of medium **70**, as shown by arrow **82**. The diffracted light exhibits nearly-parallel (nearly-planar) wave fronts **80** (e.g., the hologram serves to diffract incident spherical wave fronts into outgoing nearly-parallel wave fronts). The point-to-nearly-plane-wave holograms may, for example, be point-to-plane-wave holograms but, to compensate for aberrations in the display system, may modify the diffracted wave front so that it is not exactly a planar wave front.

[0057] In scenarios where a point-to-nearly-plane-wave reflection hologram is recorded on medium **70** (e.g., in scenarios where medium **70** of FIG. **5** is used to form reflection hologram structures **42** of FIGS. **2-4**), the point-to-nearly-plane-wave reflection hologram will diffract the incident light into an output angle at the same side of medium **70** as the incident light, as shown by arrow **82'**. The diffracted light exhibits nearly-parallel (nearly-planar) wave fronts **84'** (e.g., the hologram serves to diffract incident spherical wave fronts into outgoing nearly-parallel wave fronts). When configured in this way, the hologram itself exhibits optical power (e.g., optical power that would otherwise be provided with a curved, refractive optical surface). The optical power of the holograms may be tuned to adjust the shapes of the outgoing wave fronts relative to the incoming wave fronts.

[0058] The examples of FIGS. **5** and **6** illustrate replay of holograms written to medium **70**. Similar light sources (e.g., plane wave light sources, nearly-plane-wave light sources, and point light sources) may be used to record the holograms on medium **70**. The examples of FIGS. **5** and **6** are merely illustrative. In another suitable arrangement, the holograms may be plane-wave-to-plane wave holograms (e.g., holograms that diffract incoming parallel wavefronts into outgoing parallel wave fronts), plane-wave-to-point holograms (e.g., holograms that diffract incoming parallel wave fronts into outgoing spherical wave fronts), nearly-plane-wave-to-point holograms (e.g., holograms that diffract nearly-parallel wave fronts into outgoing spherical wave fronts), etc. In general, the holograms used to form multi-layer holographic combiner **40** may diffract incoming light having any desired wave fronts into outgoing light having any desired wave fronts.

[0059] In one suitable arrangement, as an example, transmission hologram structures **44** include point-to-plane-wave